

Internet Protocol(IP): The Key to Joint Communications
EWS Contemporary Issues Paper
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19 February 2008

Report Documentation Page				Form Approved OMB No. 0704-0188	
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1. REPORT DATE 19 FEB 2008		2. REPORT TYPE		3. DATES COVERED 00-00-2008 to 00-00-2008	
4. TITLE AND SUBTITLE Internet Protocol(IP): The Key to Joint Communications				5a. CONTRACT NUMBER	
				5b. GRANT NUMBER	
				5c. PROGRAM ELEMENT NUMBER	
6. AUTHOR(S)				5d. PROJECT NUMBER	
				5e. TASK NUMBER	
				5f. WORK UNIT NUMBER	
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) United States Marine Corps,Command and Staff College, Marine Corps Combat Development Command,Marine Corps University, 2076 South Street,Quantico,VA,22134-5068				8. PERFORMING ORGANIZATION REPORT NUMBER	
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)				10. SPONSOR/MONITOR'S ACRONYM(S)	
				11. SPONSOR/MONITOR'S REPORT NUMBER(S)	
12. DISTRIBUTION/AVAILABILITY STATEMENT Approved for public release; distribution unlimited					
13. SUPPLEMENTARY NOTES					
14. ABSTRACT					
15. SUBJECT TERMS					
16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT Same as Report (SAR)	18. NUMBER OF PAGES 16	19a. NAME OF RESPONSIBLE PERSON
a. REPORT unclassified	b. ABSTRACT unclassified	c. THIS PAGE unclassified			

We live in an unpredictable world, fighting an undefined enemy determined to reduce America's presence in the world and to destroy the freedoms we enjoy. To defeat today's globally dispersed enemies, we must have a pervasive network to pass information (intelligence, logistics, and more) unimpeded, among Soldiers, and leaders-in garrison, en route and when deployed. We must continue upgrading our network infrastructure, satellites and organizations to provide network capabilities to Soldiers fighting in units and in small, dispersed teams throughout the world. As the enemy fights for a new world order, this network-second only to people-is becoming our most important asset.¹

Introduction

Today's warfighting forces are accomplishing missions with the resources that they are provided because they are trained to make things happen, or as comedian Larry the Cable Guy says, "git 'er done"²; however, if provided improved communications systems, they would be able to fight more effectively. The use of Internet Protocol (IP) has impacted how people live and work, and can be utilized to enhance America's military operations: "... its primary purpose is to enable communication between networks."³ IP can bring users from a variety of locations and networks together on a common platform. The technology and platforms have been developed, tested, and fielded. Even though these capabilities are currently being used with positive results, some remain

¹ Steven W. Boutelle, LTG "Army Communications: Building Strong Networks for our Warfighter." Army (Oct 2006): ProQuest Information and Learning Company. (17 Dec 2007)

² Daniel L. Whitney, *Larry the Cable Guy*, 1999. <http://www.larrythecableguy.com>> (5 January 2008).

³ Doug Lowe, *Networking for Dummies* (Indianapolis: Wiley, 2007), 110

skeptical that new communication systems are necessary for use by today's joint forces. The current military communication systems should be replaced by commercial-off-the-shelf (COTS) Internet protocol (IP) -based communications systems because they enhance capabilities, are cost effective, and are interoperable.

Current Communication Systems

The U.S. military possesses a large variety of communications systems. Some of these systems have been around since the Vietnam era, while others are in the process of being fielded. The equipment is categorized as single channel radios(SCR), switch backbone(SBB), local area networks (LANs)and special purpose systems.⁴ When used in collaboration, these systems provide good communication abilities; however, limitations exist, and not all capabilities extend to the warfighter.

The military employs a combination of HF, UHF, and VHF single and multi-channel radios, switching backbones, LANs, satellites, and special purpose systems to create a circuit-based network that links the warfighter to the command posts and to elements in rear areas that have the ability to call

⁴ U.S. Department Of The Navy, Marine Corps Warfighting Publication (MCWP) 6-22, *Communications and Information Systems*, 1998 (Washington, D.C.: GPO, 1998), 5-1.

and/or email anyone, anywhere. "Traditional networks using fixed-circuit data rates, frequency division multiple access satellite links and analog voice systems severely limit customers' flexibility to change communications services and bandwidth allocations."⁵ These systems, often referred to as legacy systems, are comprised of many different racks of communications gear packed into military HMMV's. The size of these systems and their associated repair kits can complicate or even delay rapid deployment efforts. The traditional systems provide enough communication services to allow the warfighters to accomplish the mission, but not in the most rapid or efficient method possible.

These systems allow the warfighter to "git 'er done"; however, these traditional legacy systems are not enough. As U.S. Army BG Mark Bowman (director of C4 systems (J6) CENTCOM said, "The guys out there need the data . . . They've got to reach back: ... they've got to be able to get it; ... it's got to be timely and dependable."⁶ All of these traditional systems serve a purpose, but many of them are becoming obsolete as the capabilities of IP technology are discovered and proven.

⁵ CPT Jillian Klug, USA, and Capt James Lowery, USMC, "Internet Protocol Key to Smaller, Lighter Communications Devices," *SIGNAL Magazine*, May 2005, <<http://www.afcea.org/signal/articles>> (13 February 2008).

⁶ Robert Ackerman and Rita Boland, "Innovation, Diversification Define CENTCOM Communications," *SIGNAL*, Volume 62 #3 (2007): 19.

Capabilities of IP-based Systems

Current IP-based systems provide enhanced capabilities that are configured in a smaller and more reliable package. These systems are mobile, versatile, and user friendly. IP-based technology connects the warfighters of the joint forces to data rich networks and command and control communications services in a more efficient and accessible package.

Many IP-based systems are currently being tested and employed to replace the traditional circuit-based systems in Iraq and Afghanistan. One example being employed by Army units is the Joint Network Node (JNN), a package that provides voice, video, and data to battalion level command posts. Bill Weiss, Vice President of Tactical Networks for General Dynamics C4 systems, recently remarked on its success: "The JNN is performing exceptionally well in support of operations in Iraq and Afghanistan. It provides a significant upgrade in capability across the spectrum of operations, providing greater bandwidth across the force and increased access to DISN service." ⁷ To extend these improved services to tactical warfighters (echelons below battalion), the Army has begun incorporating the Warfighter Information Network-Tactical

⁷John McHale, "Can You Hear Me Now?" Military & Aerospace Electronics Vol 18 Iss 7 (2007) pg 24. ProQuest (29 October 2007)

(WIN-T). The WIN-T provides the same services as the JNN while stationary or on-the-move, thus allowing the warfighter to send and receive without sacrificing momentum. These packages provide improved communication services utilizing IP technology in large vehicle mounted assemblages.

The Joint Communications Support Element has spent recent years developing and testing the Small Command and Control over Internet Protocol (SC2IP) package. This considerably smaller package uses Everything over IP (EoIP) technology to extend "communications services from the Global Information Grid (GIG) to the warfighter through Defense Information System Agency teleports."⁸ Communications packages such as SC2IP that utilize EoIP eliminate the need for cumbersome legacy circuit switches and serial cabling. This package can provide both secure and non-secure internet, VTC, DSN access and DISN video systems-global for up to 60 users. The SC2IP package sends communication services over IP satellite modems in a method that allocates bandwidth as it is required. This results in a more efficient and flexible network for the joint forces. According to two JCSE planning team officers, "EoIP architecture is easily scalable, extremely flexible and cost-efficient, and it enables the warfighter to tailor networks to

⁸ Dave Munichiello, CPT, USAF, "Technology Delivers Agility For Combat Commanders," *SIGNAL Magazine*, December 2006, <<http://www.afcea.org/signal/articles>> (14 February 2008).

meet ever-changing needs with less cost, a smaller foot print and fewer equipment operators at a moment's notice."⁹ Through experimenting with IP, the joint forces are beginning to realize the enhanced capabilities that IP-based communications systems provide.

Cost Effectiveness of IP

IP-based communication systems offer a cost effective platform for today's rapid maneuvering warfighters. The U.S. military acknowledges that possessing and employing the most cutting edge technology is essential in order to win today's wars. "... military systems always have emphasized the need to access the front line soldier, sailor, or airman on the move, even when technological limitations made such access quite costly." ¹⁰ To reduce the cost of acquiring such technology the military has begun relying on civilian off the shelf (COTS) products. This is especially applicable with communication equipment and systems. "The difference is the adoption of commercial technology ... Internet protocol and voice over IP (VoIP) products cost less and perform better ..." ¹¹ Purchasing COTS communications equipment saves military

⁹ Klug and Lowery

¹⁰ K.D. Sachdev, "The Future of Mission-Driven Technology" Satellite News 27, Iss. 31, (2004) 1. *ProQuest*, (30 November 2007).

¹¹ John McHale

services money because the civilian companies cover the expenses involved with the research and development, and then market the new system to the military. The civilian technology industry is a competitive arena that continues to develop faster, smaller, lighter weight, cheaper and improved technology that benefits the military.

IP systems being developed are continuing to be produced in smaller packages. The reduced size makes it more affordable to deploy, such as in the case of the SC2IP package. What once required three aircraft pallets now fits into three transit cases that fit in an overhead baggage compartment.

Procurement of COTS developed IP-based systems is a cost efficient solution to improved communication systems for the joint warfighters. "Harnessing IP technology offers a potentially more affordable path for military communications interoperability in the future."¹²

Interoperability within a Net-centric Force

In recent years, the U.S. military has fought against terrorism as a joint effort. One of the significant lessons learned is that when working in combined task forces, the services need to be able to communicate at lower levels in order to accomplish the mission(s). The forces have

¹² Clarence A Robinson Jr., "Advances Boost Tactical Nodes," *SIGNAL* Vol. 61 No. (2007) 49.

recognized the need for interoperability, as Army BG Mark Bowman recently remarked, "We will never fight again as an army, as an air force, as a navy and as Marines. We will fight joint ..." ¹³ The IP-based technology that the military recently began using facilitates the transformation to a joint force. One device that uses the Internet Protocol layer of the network is the recently developed Network Centric Radio System (NCRS). Dr. Larry B. Stotts, Program Manager of NCRS says, "This gateway technology allows interoperability among various existing and future communications systems via the network." ¹⁴ Implementation of NCRS will allow the military to bring all the forces together on a joint network using their existing devices. The technology developed with NCRS "will provide reliable, mobile and secure backbone battlefield communications." ¹⁵

To enable interoperability, the services have partnered with the Department of Defense (DoD) and industry to build the Global Information Grid (GIG), which will support information exchange throughout all elements of the DoD. Bringing all of the DoD together on the GIG will allow for standardization of communication capabilities and facilitate information sharing.

¹³ Mark Bowman, BG, "Innovation, Diversification Define CENTCOM Communications," *SIGNAL*, Vol. 62 No. 3 (2007). 25.

¹⁴ Clarence A Robinson Jr.

¹⁵ Clarence A. Robinson Jr.

The sharing of data such as intelligence updates, threats, and mission objectives will allow the joint forces to work together more efficiently to accomplish the mission.

Establishing the GIG brings the military services one step closer to being the network-centric force that Secretary of Defense, Donald Rumsfeld, called for in his 2003 transformation planning guidance. The Force Transformation published *The Implementation of Network-Centric Warfare* in 2005 in which DoD outlined the requirement for a networked force to enable effects-based operation by U.S. forces. Network-centric warfare was defined

[as] a networked force conducting network-centric translates information advantage into combat power by effectively linking friendly forces within the battlespace, providing a much improved shared awareness of the situation, enabling more rapid and effective decision making at all levels of military operations, and thereby allowing for increased speed of execution.¹⁶

IP technology allows for interoperability and a network-centric force that can better support the warfighters and increase the success of joint forces.

¹⁶ U.S. Department of Defense, *The Implementation of Network Centric Warfare* (Washington, D.C.: Government Printing Office, 2005), <<http://www.oft.osd.mil>> (16 December 2007), 4-5.

Counterarguments

Some may be hesitant to accept new technology arguing that current capabilities are sufficient, and new technology is expensive and unreliable. Those who oppose providing new equipment to support the warfighter believe that spending money on new technology takes away funds from other efforts. However, in the case of military operations in which lives are at stake, the warfighter needs familiar and reliable communications equipment that will not fail in the uncertainty of war. IP-based systems provide affordable, consistent, and reliable communication for today's warfighter.

Other opponents of new technology are quick to point out that "Technology is only as good as the people who operate it."¹⁷ The military has arranged new product fielding so that training is included. One of the Army's Expeditionary Signal Battalions at Fort Bragg, NC recently fielded the JNN system. The process included three months with General Dynamics instructors training Soldiers how to install, operate, maintain and troubleshoot the system. With COTS IP technology the commercial companies that develop the technology provide the training to ensure that the units are ready to deploy the systems.

¹⁷ Paul McLeary, "Tech Support," *Defense Technology International (DTI)*, December 2007: 21.

Conclusion

IP-based systems are the answer to the continuing demands for instant communication and information sharing of today's joint warfighting challenges. The IP systems that have been implemented and that are in use in Iraq and Afghanistan are performing exceptionally well. Although warfighters have accomplished their missions previously without IP technology, embracing of IP-based systems enhances capabilities, is cost efficient, and enables a networked force. Robert Ackerman, SIGNAL magazine Editor-in-Chief recently stated, "Internet protocol (IP)-based technologies have enabled networking the force to unprecedented levels."¹⁸ Adopting technology that has been researched and developed commercially offers the military a cost effective method of implementation. IP systems enable the forces to share a common network that supports voice, video, and data sharing. The Army's Chief Information Officer, LTG Boutelle, confirms, "As a joint community we have converged across all the services on the IP standard."¹⁹ IP-based systems are the key to supplying the warfighter with limitless communication capabilities anywhere, anytime.

¹⁸ Robert K. Ackerman, "The Army's Network Revolution Ends." *SIGNAL* Vol 61, No. 12 (2007): 17.

¹⁹ Steven W. Boutelle, LTG

Success in the global war against terrorism requires secure, consistent, real-time communication of data that IP systems make possible. Victory on the modern battlefield requires information superiority.

Word Count = 1986

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